COVER SHEET

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Examining mentors’ practices for developing primary teaching

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Abstract

Mentoring has become more prominent in teacher education (Power, Clarke, & Hine, 2002), which increases the responsibilities assigned to mentors (Sinclair, 1997). The mentor’s role in preservice teacher education includes developing the mentee’s overall teaching ability, yet each mentor has individual beliefs on what is and what is not important. Five factors for mentoring have previously been identified, namely, Personal Attributes, System Requirements, Pedagogical Knowledge, Modelling, and Feedback, and items associated with each factor have also been identified and justified with the literature (Hudson, Skamp, & Brooks, 2005; Hudson, 2005). A literature-based survey instrument gathered 446 preservice teachers’ perceptions of their mentoring for primary teaching. Data were analysed within the abovementioned five factors proposed for mentoring with 331 final-year preservice teachers from nine Australian universities responding to their mentoring for science teaching and, in a subsequent year, 115 final-year preservice teachers from an urban university responding to their mentoring for mathematics teaching. Results indicated similar Cronbach alpha scores on each of the five factors for primary science and mathematics teaching; however percentages and mean scores on attributes and practices aligned with each factor were considerably higher for mentoring mathematics teaching compared with science teaching. Benchmarking mentoring practices may aid in determining ways for enhancing such practices.

All preservice teachers deserve equal opportunities to learn how to teach primary science, which occurs pragmatically with mentors (supervising or cooperating teachers) in professional experience settings (Jasman, 2002). However, the majority of mentors may not be confident in teaching primary science (Mulholland, 1999; National Science Standards, 2002) let alone mentoring in this field. Mentoring can develop teaching practices (Crowther & Cannon, 1998), as it provides opportunities for mentors and mentees to engage in pedagogical discourse and reflective thinking. Mentoring has become more prominent in teacher education (Power, Clarke, & Hine, 2002), which increases the responsibilities assigned to mentors (Sinclair, 1997). This has implications for primary teachers in their roles as mentors, as there are several subject areas in the primary school that generalist primary teachers are expected to teach, and it is likely that these teachers will not have expertise in all areas. For example, many generalist primary teachers either teach science inadequately or not at all (Goodrum, Hackling, & Rennie, 2001). Hence, primary teachers who become mentors may not have mentoring expertise to effectively guide the mentee's learning across all subject areas, and this includes primary science.

Modelling and articulating effective practices are key aspects of mentoring; however "non-expert" mentors of primary science may not be able to model or discuss effective science teaching practices. Just as teachers can always improve their methods of teaching, so too can mentors improve their methods of mentoring. Mentors need to have an "understanding of scientific knowledge and scientific methods" in order to implement effective mentoring programs in science (Hodson & Hodson, 1998, p. 23). There have been opportunities in various countries for primary teachers to develop science knowledge and methods of mentoring. For example, New York State Department of Education offered educational opportunities to teachers through workshops, seminars, and courses with specific mentoring skills being taught (Ware, 1992). The New South Wales Department of Education and Training has also educated selected teachers on becoming mentors (NSW DET, 2003). Although these courses aimed to provide mentoring strategies, not all potential or existing mentors are prepared to participate in a mentoring training course. Hulshof and Verloop's study (1994) reports that 74% of mentors felt education in mentoring was necessary but considered such education more important for new mentors. As curricula continually changes, teachers are required to develop further understandings and skills in order to advance their practices. Similarly, mentors also need to ensure that their understandings and skills are current.

Gaston and Jackson (1998) claim that mentors must be thoroughly educated on explicit mentoring practices with mentor programs that are well organised. Primary teachers may need to be formally prepared for their roles as mentors, as in most cases "mentors are thrust into the new role of mentoring with only the most meagre guidance" (Edwards & Collison, 1996, p. 11). Mentors "need explicit training in the stimulation of novice teachers to reflect on their actions in order to move them to higher levels of professional thinking" (Veenman, de Laat, & Staring, 1998, p. 6).

Mentors can be "agents of change" (Edwards & Collison, 1996, p. 134); yet to become agents of change in primary science education may require further education for such mentors. Indeed, primary teachers who have been educated in mentoring for science teaching are more confident in raising issues, expect specific learning outcomes, place greater emphasis on pedagogical knowledge, and aim to improve their own skills of observing primary science teaching practices (Jarvis, McKeon, Coates, & Vause, 2001). Jarvis et al further argue that developing mentoring practices in primary science requires the provision of specific objectives for mentors to focus on.

Using objectives to provide specific feedback for mentees

Preservice teachers are learners and "learners need goals" (Edwards & Collison, p. 11). Mentoring preservice teachers should be an intentional process, as a formal mentoring program increases the likelihood of achieving the mentee's needs (Ackley & Gall, 1992). Researchers (Christensen, 1991; Griffin, 1985; McLaughlin, 1993; Monk & Dillon, 1995; Showers & Joyce, 1996) stress that mentors need specific objectives as a focus for providing feedback. This study argues that mentors require further education on establishing clear and obtainable objectives so that mentoring specific subjects such as science becomes more purposeful. Furthermore, feedback will be more useful if it addresses the mentee's needs in relation to the objectives that aim at producing effective primary science teaching (Jarvis et al., 2001). Objectives that are linked to indicators of effective practices may provide directions for both mentors and mentees, and as such provide evidence on the achievement of the objectives (Hudson, 2004).

Educating mentors on subject-specific mentoring

Mentors may require professional development on the specific subject they are mentoring (e.g., Hodge, 1997). Research (Jarvis et al., 2001) shows this to be the case for primary science teaching. Although some mentoring can emerge naturally, educators need to ensure that mentoring is not left to chance (Ganser, 1996); hence it is necessary to plan the learning experiences for mentoring (Weaver & Stanulis, 1996). A major part of the mentor's role in primary education is to develop the mentee's overall teaching ability, yet each mentor has individual beliefs on what is and what is not important. These individual mentor views will vary on any aspect of teaching and mentoring, from the planning through to the choice of classroom procedures for implementing a teaching strategy. Coates, Vause, Jarvis, and McKeon (1998, p. 9) state that teachers' experience of mentoring and teaching vary widely, and that mentors do not receive specific mentoring training in primary subject areas such as primary science or primary mathematics.

Five-factor model for mentoring in primary teaching

Five factors for mentoring have previously been identified, namely, Personal Attributes, System Requirements, Pedagogical Knowledge, Modelling, and Feedback (Hudson & Skamp, 2003a, see Figure 1), and items associated with each factor have also been identified and justified with the literature (Hudson & Skamp, 2003b; Hudson, Skamp, & Brooks, 2005).

Purpose of this study

This study explores and describes final-year preservice teachers' perceptions of their mentoring in primary science education within five factors linked to a literature-based instrument (see Appendix 1 for final instrument).

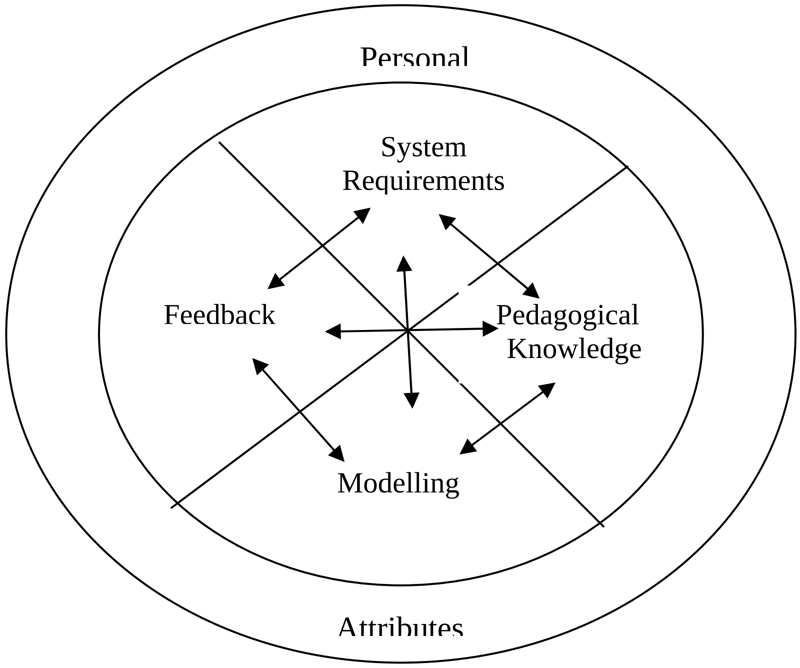

Figure 1. Five-factor model for mentoring.

Data collection method and analysis

The "Mentoring for Effective Primary Science Teaching" (MEPST, Appendix 1) survey instrument in this study evolved through a series of preliminary investigations on mentoring for effective primary science teaching. Steps for developing and validating the survey instrument included small-scale interviews with mentors and mentees (*n*=10) on their perceptions of mentoring preservice primary science teaching at the conclusion of a three-week professional experience. The literature-based survey instrument was pilot tested on 21 first-year preservice teachers (Hudson, 2003) and later with 59 final-year preservice teachers (Hudson & Skamp, 2003a) at the conclusion of their professional experiences. Analysis of these pilot tests provided data for refining the instrument to be administered to final-year preservice teachers from nine Australian universities. Responses to these items were on a five-part Likert scale (i.e., strongly disagree=1, disagree=2, uncertain=3, agree=4, strongly agree=5). These data were subjected to confirmatory factor analysis (CFA; Hair, Anderson, Tatham, & Black, 1995), which defined a relationship between the variables (items) assigned to each factor (see Hudson et al., 2005). Eigenvalues greater than one also indicated a relationship between factors and associated items (Hair et al., 1995). The MEPST survey instrument was then altered to reflect mentoring for effective mathematics teaching (MEMT). That is, the word "science" was replaced with “mathematics” and the survey was administered to 115 final-year preservice teachers from the same university. For this study, data were analysed within each of the five factors (i.e., Personal Attributes, System Requirements, Pedagogical Knowledge, Modelling, and Feedback) for developing primary science and mathematics teaching and descriptive statistics were derived using a statistical analysis package.

Results and discussions

The 331 complete responses (284 female; 47 male) from final-year preservice teachers received from nine Australian universities provided data on the five factors and descriptors of the participants (mentors and mentees) in each of the five factors and associated variables. Responses were gathered at the conclusion of their final professional experience (i.e., practicum/field experience).

Descriptors of mentees (final-year preservice teachers)

Fifty-six percent of mentees (*n*=331) involved in primary science teaching entered teacher education straight from high school, with 52% completing biology units at school. Whereas, 31% of mentees (*n*=115) involved in primary mathematics teaching entered teacher education straight from high school, with 91% completing mathematics units at school. All mentees had completed at least one methodology unit at university in science (*n*=331) and mathematics (*n*=115), and all mentees had completed at least three block professional experiences (practicums). There were no professional experiences under a three-week duration, and 66% of mentees involved in science had professional experiences of a five-week duration or more (57% for those involved in mathematics). Although 84% of mentees (*n*=115) taught more than six mathematics lessons during their last practicum, the number of science lessons taught by mentees (*n*=331) varied considerably (11% taught one lesson; 6% two lessons; 22% three or four lessons; 38% six lessons or more; and 15% did not teach science at all).

Descriptors of mentors

Most mentors were over 40 years old, although 17% were under 30 years of age for both science and mathematics. Mentees indicated that 27% of mentors did not have an “interest” or a “strong interest” in science, whereas this was lower for mathematics (i.e., 20%). Eighty-six percent of mentors modelled at least one mathematics lesson including 57% who modelled five or more lessons compared with 40% of mentors did not model a science lesson during their mentees’ professional experiences.

Five factors

The five factors were analysed through confirmatory factor analysis on mentoring practices for developing final-year preservice teachers' science and mathematics teaching. Cronbach alphas were considered acceptable for each factor (Table 1). Surprisingly, there were similarities between the science factors and the mathematics factors. The Pedagogical Knowledge factor had the same Cronbach alpha scores for each subject area (i.e., .94) and System Requirements was the lowest on the scale (i.e., .76 [science] & .74 [mathematics]). In addition, the other factors were not overly dissimilar in their Cronbach alpha scores (see Table 1). Although a relationship may be drawn between the mentoring practices for developing science teaching and those provided for mathematics teaching, percentages and mean scores on specific attributes and practices associated with each factor were different. These differences will be discussed in the following sections under each of the key factors for mentoring (i.e., Personal Attributes, System Requirements, Pedagogical Knowledge, Modelling, and Feedback).

Table 1

Confirmatory Factor Analysis for Each of the Five Factors

Factor	Science (n=331)			Mathematics (n=115)		
	M	*SD*	Cronbach alpha	*M*	*SD*	Cronbach alpha
Personal Attributes	3.14	1.08	.93	3.97	0.81	.91
System Requirements	2.29	0.93	.76	2.98	0.96	.74
Pedagogical Knowledge	2.76	1.01	.94	3.61	0.89	.94
Modelling	3.09	1.07	.95	4.03	0.73	.89
Feedback	3.14	1.11	.92	3.80	0.86	.86

NB: Only one component extracted with an eigenvalue >1 for each factor.

Personal Attributes.

When analysing the mentees' responses on their mentors' "Personal Attributes", a majority of mentors (64%) were supportive towards their mentees' primary science teaching, and 56% of mentors appeared comfortable in talking about science teaching. A little more than half the mentors (53%) attentively listened to their mentees and less than half instilled confidence

(46%) and positive attitudes (45%) for teaching primary science. Aiding the mentee's reflection on teaching practices is considered a key element in the mentoring processes but 65% of mentors did not display this characteristic (Mean item score range [*M*]: 2.72 to 3.46; Standard Deviation [*SD*] range: 1.22 to 1.31; Table 2).

Mentees' perceptions of their mentoring in mathematics teaching were considerably higher than mentoring for science on each item associated with "Personal Attributes" (Table 2). Mentees also indicated that a majority of mentors facilitated mentoring practices for mathematics on all Personal Attributes, whereas three items (instilled confidence, instilled positive attitudes, and assisted in reflection) were less than 50% for mentoring in science education. Although listening attentively to the mentee was only 14% higher for mathematics, 38% more mentors were perceived to assist the mentees to reflect on mathematics practices (*M* for mentoring mathematics: 3.67 to 4.35; *SD* range: 0.85 to 1.08; Table 2).

Table 2

"Personal Attributes" for Mentoring Primary Teaching

Mentoring Practices/Attributes	Science (*n*=331)			Mathematics (*n*=115)		
	%*	*M*	*SD*	%*	*M*	*SD*
Supportive	64	3.46	1.31	89	4.35	0.85
Comfortable in talking	56	3.30	1.22	86	4.25	0.88
Attentive	53	3.19	1.31	67	3.67	1.07
Instilled confidence	46	3.10	1.28	64	3.75	1.08
Instilled positive attitudes	45	3.07	1.23	69	3.92	0.88
Assisted in reflecting	35	2.72	1.25	73	3.87	1.01

* %=Percentage of mentees who either "agreed" or "strongly agreed" their mentor provided that specific mentoring practice/attribute.

System Requirements.

Items displayed under the factor "System Requirements" presented a different picture from the previous factor. Both primary science mentoring practices and primary mathematics mentoring practices associated with System Requirements were all below 50% (Table 3). Nevertheless, mentoring in mathematics teaching was significantly higher than science. That is, 44% of mentors discussed the aims of mathematics teaching (only 23% for science), 29% outlined mathematics curriculum documents (18% for science), and 41% of mentors discussed the school's mathematics policies with the mentee whereas only 16% did this for science (*M* range for science: 2.22 to 2.40, *SD* range: 1.07 to 1.11; *M* for mathematics: 2.71 to 3.15; *SD* range: 1.14 to 1.24; Table 3).

Table 3

"System Requirements" for Mentoring Primary Teaching

Mentoring Practices	Science (*n*=331)			Mathematics (*n*=115)		
	%*	*M*	*SD*	%*	*M*	*SD*
Discussed aims	23	2.40	1.11	44	3.15	1.14
Outlined curriculum	18	2.27	1.11	29	2.71	1.24
Discussed policies	16	2.22	1.07	41	3.06	1.18

* %=Percentage of mentees who either "agreed" or "strongly agreed" their mentor provided that specific mentoring practice.

At this fundamental level of learning about System Requirements, mentees perceived they received minimal mentoring experiences towards planning for their science and mathematics teaching experiences. Not taking into account previous professional experiences and tertiary education, more than half these preservice teachers due to enter the profession may have no or little practical understanding of mandatory requirements such as aims, curriculum, and policies. Generally, departmental directives linked to primary science and primary mathematics education reform may not be implemented at the professional experience level and, hence, reform for future teaching practices may be compromised.

Pedagogical Knowledge.

In this study, a little more than a third of mentors (37%) provided necessary "Pedagogical Knowledge" for effective primary science teaching. In the planning stages before teaching science only 37% of mentors assisted in planning, with 44% discussing the timetabling of the mentee's teaching and 45% assisting with science teaching preparation (Table 3). In addition, 65% of mentors did not discuss the implementation and knowledge of science lessons, and a further 69% did not discuss questioning techniques towards more successful learning. The majority of mentors did not assist with classroom management (44%), teaching strategies (41%), assessment (31%) or problem solving strategies (25%) for effective science teaching practices, and mentees indicated that providing different viewpoints on teaching science was not a high priority with mentors (35%; *M* range: 2.60 to 2.91; *SD* range: 1.10 to 1.32; Table 4). This implies that the majority of final-year preservice teachers were not provided with adequate Pedagogical Knowledge in the school setting to develop successful primary science teaching practices.

The picture for mentoring in primary mathematics indicated higher positive responses from mentees on each of the items associated with Pedagogical Knowledge. Percentages were more than doubled for mentors discussing implementation and problem solving for developing mathematics teaching compared with science. Unlike science, the majority of mentees perceived their mentors to provide mentoring practices for enhancing their mathematics teaching (*M* for mentoring mathematics: 3.31 to 3.84; *SD* range: 1.04 to 1.24; Table 4).

Table 4

"Pedagogical Knowledge" for Mentoring Primary Teaching

Mentoring Practices	Science (*n*=331)			Mathematics (*n*=115)		
	%*	*M*	*SD*	%*	*M*	*SD*
Guided preparation	45	2.87	1.27	71	3.69	1.14
Assisted with timetabling	44	2.91	1.27	67	3.74	1.16
Assisted with classroom management	44	2.85	1.32	73	3.77	1.08
Assisted with teaching strategies	41	2.86	1.23	68	3.73	1.16
Assisted in planning	37	2.72	1.23	64	3.61	1.04
Discussed implementation	35	2.70	1.19	77	3.84	1.08
Discussed content knowledge	35	2.73	1.19	52	3.31	1.24
Provided viewpoints	35	2.81	1.23	61	3.51	1.17
Discussed questioning techniques	31	2.67	1.21	57	3.45	1.11
Discussed assessment	31	2.64	1.22	52	3.50	1.19
Discussed problem solving	25	2.60	1.10	57	3.51	1.08

* %=Percentage of mentees who either "agreed" or "strongly agreed" their mentor provided that specific mentoring practice.

Modelling.

Modelling teaching provides mentees with visual and aural demonstration of how to teach, yet other than modelling a rapport with their students involved in science lessons (58%) less than half the mentors were perceived to have "Modelled" science teaching practices. Mentees indicated that 48% of mentors displayed enthusiasm for science teaching and only 44% modelled science teaching, which included having well-designed science lessons (Table 5). It may be that those who modelled science teaching may have modelled classroom management (43%), and most of these mentors may have modelled effective science teaching (42%) or demonstrated a hands-on lesson (40%). Yet, 60% of mentors did not model the use of science syllabus language, which is required to scaffold the mentee's learning about how to teach science (*M* range: 2.68 to 3.41; *SD* range: 1.22 to 1.41; Table 5).

Table 5

"Modelling" Primary Teaching

Mentoring Practices	Science (*n*=331)			Mathematics (*n*=115)		
	%*	*M*	*SD*	%*	*M*	*SD*
Modelled rapport with students	58	3.36	1.24	85	4.30	0.83
Displayed enthusiasm	48	3.08	1.23	78	4.02	1.00
Modelled a well-designed lesson	44	3.09	1.26	73	3.81	0.99
Modelled teaching	44	2.68	1.25	79	4.14	0.90
Modelled classroom management	43	2.96	1.30	82	4.11	0.97
Modelled effective teaching	42	3.11	1.22	71	3.83	1.19
Demonstrated hands-on	41	3.01	1.26	81	4.03	1.04
Used syllabus language	40	3.04	1.22	78	3.97	0.89

* %=Percentage of mentees who either "agreed" or "strongly agreed" their mentor provided that specific mentoring practice.

Conversely, more than 70% of mentors were perceived to provide practices associated with Modelling mathematics teaching (*M* for mentoring mathematics: 3.81 to 4.30; *SD* range: 0.83 to 1.19; Table 5). As mathematics is considered a higher priority than science, particularly with state-wide testing, there would be more opportunities to model mathematics teaching in the weekly timetable. Nevertheless, as no practicum was under three weeks, there was amply opportunity for mentors to model at least one science lesson.

Feedback.

It is argued that mentors need to review their mentees' lesson plans and provide feedback at these formative planning stages, which was practised in this study by a borderline majority of mentors involved with mentoring primary science teaching (54%). Mentors may not guide the mentees adequately enough for teaching science effectively as 67% of mentors did not articulate their expectations for science teaching. Even so, 74% of mentors observed their mentees' teaching of science with 62% providing oral feedback on the mentee's science teaching. Written feedback was considerably less (45%), as was the mentor's feedback on towards evaluating the mentee's science teaching (46%, *M* range: 2.75 to 3.72; *SD* range: 1.23 to 1.38; Table 6). Once more, the pattern for mentoring primary mathematics teaching was higher on each of the items associated with this factor (*M* for mentoring mathematics: 3.53 to 4.17; *SD* range: 0.96 to 1.36; Table 6). Double the percentage of mentors articulated expectations for teaching mathematics than for teaching science, yet there was only a marginal difference for reviewing mentees' mathematics lesson plans (Table 6).

Table 6

Providing "Feedback" on Primary Teaching

Mentoring Practices	Science (*n*=331)			Mathematics (*n*=115)		
	%	*M*	*SD*	%	*M*	*SD*
Observed teaching for feedback	74	3.72	1.37	82	4.10	0.98
Provided oral feedback	62	3.32	1.28	85	4.17	0.96
Reviewed lesson plans	54	3.13	1.32	55	3.30	1.24
Provided evaluation on teaching	46	2.96	1.29	84	4.05	1.02
Provided written feedback	45	2.95	1.38	58	3.53	1.36
Articulated expectations	33	2.75	1.23	66	3.67	1.13

* %=Percentage of mentees who either "agreed" or "strongly agreed" their mentor provided that specific mentoring practice

Further discussions and conclusion

This study indicated that there appeared to be more mentoring in mathematics than primary science; however for a mentee to receive adequate mentoring in specific subject areas such as primary science teaching, allocating an expert "science teaching" mentor in the primary school will be extremely difficult, particularly as implementing primary science education remains largely inadequate (Goodrum et al., 2001). Expert primary science teachers who are skilled in mentoring would be best suited as mentors for preservice teachers of science, and *this* is the crux of the mentoring problem, that is, educating primary teachers to be sufficiently skilled for mentoring in all primary subjects. There were also a considerable number of mentees who perceived their mentor had not provided adequate guidance for teaching mathematics.

Mentees claim the in-school context is pivotal to their development as teachers (Gaffey, Woodward, & Lowe, 1995; Jasman, 2002), yet the current state of mentoring in primary teaching without subject expertise implies that many preservice teachers will not receive equitable mentoring in either science or mathematics. Mentees should receive equitable mentoring in all primary teaching subject areas, which will require subject-specific mentoring skills. The inadequate mentoring highlighted in this study may be initially addressed through specific mentoring interventions that focus on each of the items associated with the survey instrument (Appendix 1). Additionally, tertiary institutions may employ the instrument to gauge the degree and quality of mentoring in specific subject areas and, as a result of diagnostic analysis, plan and implement mentoring programs that aim to address specific needs of mentors in order to enhance the mentoring process. The survey instrument may also assist mentors in their education on subject-specific mentoring as a way to measure their own mentoring practices for enhancing these practices. As the mentoring attributes and practices in this study were derived from the generic literature on mentoring, this survey instrument (Appendix 1) can be amended to reflect other curriculum areas, for example, by changing the word "science" to "music" or "English". The instrument may also be altered to gather information on strands within subject areas (e.g., substituting "science" with "reading" or "writing").

This study only focused on the mentees' perceptions of their mentors' practices. Even so, if the mentees perceived they have not received adequate mentoring in particular areas then either the mentors had not provided that practice or it was not explicit enough for the mentees to recognise it. There is no research in this study on the mentees' practices and roles. Indeed, as mentoring is a two-way dialogue then the other half of the picture needs to establish the mentees' practices and roles in quantitative and qualitative terms. Finally, and extending past this study, educating mentors may require expert mentors who are recognised for their expertise in both mentoring and teaching in order to have credibility within the teaching profession. Expert mentors may also need to: display personal attributes, articulate system requirements, model effective mentoring (which also requires modelling effective teaching practices), provide clear pedagogical knowledge, and articulate methods of feedback towards enhancing mentoring practices. Further research would be needed to determine if the five factors for mentoring in primary science teaching may be the same factors applicable to mentor educators.

In conclusion, the mentor's involvement in facilitating the mentee's learning for more effective primary teaching cannot be indiscriminate; instead it must be predetermined and sequentially organised so that the mentor's objectives are focused, specific, clear, and obtainable. Effective mentoring aims at developing preservice teachers' real-life learning experiences and opportunities for developing effective teaching practices within school settings, therefore, educating mentors on subject-specific mentoring practices may enhance this process.

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Appendix 1

Mentoring for Effective Primary Science Teaching (MEPST)

The following statements are concerned with your mentoring experiences in primary science teaching during your last practicum/internship. Please indicate the degree to which you agree or disagree with each statement below by circling the appropriate scale to the right of each statement.

Key
SD = Strongly Disagree **D** = Disagree **U** = Uncertain **A** = Agree **SA** = Strongly Agree

During my final professional school experience (i.e., internship/practicum) in primary science teaching my <u>mentor</u>:

1. was supportive of me for teaching science. …………………………	SD	D	U	A	SA
2. used science language from the current primary science syllabus.	SD	D	U	A	SA
3. guided me with science lesson preparation. …………..…………….	SD	D	U	A	SA
4. discussed with me the school policies used for science teaching. ..	SD	D	U	A	SA
5. modelled science teaching. ………………………………………	SD	D	U	A	SA
6. assisted me with classroom management strategies for science teaching.	SD	D	U	A	SA
7. had a good rapport with the primary students doing science. ……..	SD	D	U	A	SA
8. assisted me towards implementing science teaching strategies. ….	SD	D	U	A	SA
9. displayed enthusiasm when teaching science. …………………..….	SD	D	U	A	SA
10. assisted me with timetabling my science lessons. …………………	SD	D	U	A	SA
11. outlined state science curriculum documents to me. ………………	SD	D	U	A	SA
12. modelled effective classroom management when teaching science.	SD	D	U	A	SA
13. discussed evaluation of my science teaching. ………………………	SD	D	U	A	SA
14. developed my strategies for teaching science. …………………….	SD	D	U	A	SA
15. was effective in teaching science. …………………………………	SD	D	U	A	SA
16. provided oral feedback on my science teaching. …………………	SD	D	U	A	SA
17. seemed comfortable in talking with me about science teaching. ….	SD	D	U	A	SA
18. discussed with me questioning skills for effective science teaching.	SD	D	U	A	SA
19. used hands-on materials for teaching science. …………………….	SD	D	U	A	SA
20. provided me with written feedback on my science teaching. ……..	SD	D	U	A	SA
21. discussed with me the knowledge I needed for teaching science.	SD	D	U	A	SA
22. instilled positive attitudes in me towards teaching science. ……….	SD	D	U	A	SA
23. assisted me to reflect on improving my science teaching practices.	SD	D	U	A	SA
24. gave me clear guidance for planning to teach science. ……………	SD	D	U	A	SA
25. discussed with me the aims of science teaching. …………………..	SD	D	U	A	SA
26. made me feel more confident as a science teacher. ……………….	SD	D	U	A	SA
27. provided strategies for me to solve my science teaching problems.	SD	D	U	A	SA
28. reviewed my science lesson plans before teaching science. …….	SD	D	U	A	SA
29. had well-designed science activities for the students. …………….	SD	D	U	A	SA
30. gave me new viewpoints on teaching primary science. …………...	SD	D	U	A	SA
31. listened to me attentively on science teaching matters. …………...	SD	D	U	A	SA
32. showed me how to assess the students' learning of science. …....	SD	D	U	A	SA
33 clearly articulated what I needed to do to improve my science teaching.	SD	D	U	A	SA
34. observed me teach science before providing feedback. …………..	SD	D	U	A	SA

NB: The instrument "Mentoring for Effective Mathematics Teaching" (MEMT) replaced the word "science" with "mathematics".